

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/039515

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 F22B1/08 E21B43/24 C02F1/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 F22B E21B C02F F01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/127226 A1 (HEINS WILLIAM F) 10 July 2003 (2003-07-10) paragraphs '0014! - '0025!, '0043! - '0056!; figures 4,5 abstract	1-34
A,P	US 6 733 636 B1 (HEINS WILLIAM F) 11 May 2004 (2004-05-11) column 4, line 17 - column 6, line 67; figures abstract	1-34
A	US 4 418 651 A (WYATT ET AL) 6 December 1983 (1983-12-06) column 5, line 22 - column 7, line 5; figures 1,4 abstract	1-34
----- -/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

27 May 2005

Date of mailing of the international search report

06/06/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Zerf, G

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/039515

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 730 577 A (HOUGHTON ET AL) 15 March 1988 (1988-03-15) column 2, line 19 - line 51 column 2, line 63 - column 3, line 55; figure abstract	1-34
P,A	----- US 6 675 747 B1 (GOIDICH STEPHEN J ET AL) 13 January 2004 (2004-01-13) the whole document -----	1-34

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/039515

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003127226 A1	10-07-2003	US 6733636 B1 US 2005022989 A1 CA 2307819 A1	11-05-2004 03-02-2005 07-11-2000
US 6733636 B1	11-05-2004	US 2003127226 A1 US 2005022989 A1 CA 2307819 A1	10-07-2003 03-02-2005 07-11-2000
US 4418651 A	06-12-1983	NONE	
US 4730577 A	15-03-1988	NONE	
US 6675747 B1	13-01-2004	CA 2437479 A1 CN 1485568 A	22-02-2004 31-03-2004